

Chapter 1. Introduction

The California Department of Water Resources, in cooperation with CALFED, is studying the feasibility of four offstream storage sites in the Sacramento Valley, north of the Sacramento-San Joaquin Delta: (1) the Sites Project, (2) the Colusa Project, (3) the Thomes-Newville Project, and (4) the Red Bank Project. DWR received initial funding and authorization to study offstream storage projects upstream of the Delta when voters approved Proposition 204, the Safe, Clean, Reliable Water Supply Act, in 1996. Subsequent funding has been allocated to DWR's General Fund, as part of the Integrated Storage Investigations program. Concurrently, CALFED has developed a Water Management Strategy that includes surface storage as one of many available water resources management tools to achieve its water supply reliability objective. An initial listing of surface storage sites included 52 potential candidates. Preliminary screening narrowed the candidate list to twelve, including the four offstream storage projects indicated above. In addition to this North of the Delta Offstream Storage Investigation, other ISI investigations are studying the remaining 8 candidates.

This progress report summarizes the work conducted under the North of the Delta Offstream Storage Investigation since 1997. While the investigation continues, this status report has been prepared to document findings to date. This document provides information to CALFED agencies and the public about the projects under evaluation. Comments received from the agencies and other stakeholders on the direction of the work in progress and future program activities will help maintain a sound and balanced program.

The North of the Delta Offstream Storage Investigation consists of three phases, each including public involvement. Phase I studies include extensive field surveys of environmental resources; geological, seismic and foundation evaluations; potential environmental impacts; and preliminary engineering feasibility. Phase I has provided basic information on the costs, benefits, and potential impacts of north of the Delta offstream storage for consideration in CALFED's programmatic Environmental Impact Statement/Environmental Impact Report. Phase II will begin in mid-2000 after a federal Record of Decision is issued and the State certifies the Final Programmatic EIS/EIR, with a finding that north of the Delta offstream storage is consistent with CALFED's programmatic preferred alternative. Phase II will include preparation of a feasibility report, project environmental documentation, and the permits necessary to construct the most feasible project, if one is identified. Phase III would consist of final design, which would proceed contingent on findings during the Phase II investigation. Final design would precede construction.

Each of the four projects evaluated in this investigation includes a reservoir that is considered offstream, as well as optional diversion and conveyance facilities associated with various water supply sources. In addition, the projects will include facilities for delivery of the water stored in the offstream reservoir. Final decisions about the optimal water supply sources, and diversion and conveyance facilities for each project will be made based on current and forthcoming analyses.

CALFED Programs and Section 404 Screening Process

In 1995, the CALFED Bay-Delta Program was established to develop a long-term, comprehensive plan that will restore ecological health and improve water management for beneficial uses of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Since then, CALFED agencies and stakeholders have been working to develop a balanced plan that will restore ecosystem health, improve levee stability in the Delta, and improve water quality and water supply reliability. After initial evaluations and extensive stakeholder input, the study to address supply reliability evolved into an all-inclusive analysis of water management tools: water use efficiency (conservation and recycling), water transfers, operational strategies (such as real-time diversion management), conveyance, and storage.

Early in the process, CALFED compiled a list of 52 potential surface storage projects in the Central Valley and began an initial screening to reduce the number of sites to a more manageable number for more detailed evaluation. CALFED was specifically looking for potential sites that could provide broad benefits for water supply, flood control, water quality, and the ecosystem. This initial screening of potential surface storage projects is consistent with the federal Clean Water Act Section 404 alternative analysis requirements.

The initial screening identified and eliminated those reservoir sites that were clearly impracticable. This screening was based on a minimum storage capacity of 200 taf, a determination of potential conflict with CALFED's restoration programs, and an assessment of consistency with CALFED's solution principles and policies. An interagency team of CALFED agencies cooperated in the initial screening, which was performed using available information. Forty surface storage sites were removed from the initial list. The remaining 12 storage sites are:

- Four north of the Delta offstream storage alternatives, including the Red Bank Project, Thomes-Newville Project, Colusa Project, and Sites Project.
- In-Delta storage and enlargement of Los Vaqueros Reservoir.
- Four south-of-the-Delta storage alternatives, including Ingram Canyon Reservoir, Quinto Creek Reservoir, Panoche Reservoir, and Montgomery Reservoir.
- Enlargement of Shasta Lake (Shasta Dam) and Millerton Lake (Friant Dam).

Figure 1-1 shows the location of the 12 remaining storage sites. For more detailed information about the initial screening, please refer to the *Draft Initial Surface Water Storage Screening*, CALFED Bay-Delta Program, December 22, 1999.

**Figure 1-1. Integrated Storage Investigations
Potential Surface Water Storage Alternatives**



In addition to the initial screening, the CALFED reservoir screening process will also include an anticipated second stage screening. The second stage screening will be performed using more detailed information and will be based on more specific project purposes since not all potential sites can provide the same function. For example, a north of the Delta offstream storage project could help improve water quality in the Delta during drier years, but could not be used to regulate flows on the San Joaquin River. Montgomery Reservoir can improve regulation of San Joaquin River flows, but can not provide the flexibility for Delta pumping that in-Delta or off-aqueduct storage can provide. The second stage will evaluate the remaining reservoir sites based on detailed project purpose and environmental, engineering, and economic analyses. An extensive environmental inventory, detailed engineering analyses, and geological exploration are currently under way for the North of the Delta Offstream Storage Investigation. Information gathered will be used for the second stage screening as well as for environmental documentation, permits, and project feasibility evaluations. The second stage screening will lead to selection of a preferred alternative for the North of the Delta Offstream Storage Investigation.

Program Development and Funding

In 1996, voters approved Proposition 204—the Safe, Clean, Reliable Water Supply Act—which provided funding of feasibility and environmental investigations of regional water recycling, water transfer facilities, desalination, and offstream storage projects upstream of the Delta. In 1997, DWR began a two-year reconnaissance-level study of North of the Delta Offstream Storage Investigation under Proposition 204. In fiscal year 1997-98, DWR expended \$3 million of Proposition 204 funds to start this investigation. The Budget Act of 1998 authorized DWR to spend up to \$10 million of its General Fund appropriation in FY 1998-99 for feasibility and environmental studies pertaining to the Sites Reservoir site and alternatives. As a result, DWR expanded the 1997 reconnaissance study to a broader investigation that could eventually lead to feasibility reports, environmental documentation, and project permits. DWR expended \$8.4 million on these studies during FY 1998-99.

In early 1999, CALFED consolidated all storage investigations under a comprehensive program called the Integrated Storage Investigations. The North of the Delta Offstream Storage Investigation was incorporated into one of seven original ISI program elements. For FY 1999-2000, \$10 million of State general funds have been allocated to ISI, of which up to \$4.2 million is available for the North of the Delta Offstream Storage Investigation.

Offstream Storage, Alternative Reservoir Sites, Water Supply Sources, and Conveyance Facilities

Traditionally, reservoirs have been created by constructing dams on major streams. These reservoirs are considered onstream storage. In contrast, an offstream storage reservoir is typically constructed on a small and generally seasonal stream that contributes a minor share of the water supply of the reservoir. Offstream storage involves diverting water out of a major stream and transporting the water through various conveyance systems to a reservoir that

may be miles away from the point of diversion. Therefore, offstream storage investigations include extensive evaluation of diversion and conveyance facilities to carry the water to the reservoirs.

Storing water in offstream reservoirs can provide opportunities to increase dry year water supply reliability and improve the timing of its availability for multiple uses in an environmentally sensitive manner. Storing water during times of high flow may provide flood control benefits, improve water quality during dry periods, and increase water supplies for environmental, urban, and agricultural water uses.

Offstream storage north of the Delta would allow water to be diverted and stored during winter and early spring, when the Sacramento River and local streamflows are highest, which could reduce flood damage in some areas. Then, from May through October, water from the reservoir could be released for local agricultural irrigation and wetland water use in exchange for diversions that would have occurred from the Sacramento River. Such an exchange program would reduce diversion of water from the river during the irrigation season, therefore reducing diversion impacts to the Sacramento River fishery.

Water that would otherwise have been diverted from the Sacramento River for local irrigation in late spring and summer would be kept in the river or Shasta Lake for later downstream use. The exchange described here will result in increased storage and more cold water in Shasta Lake during the spring and early summers, which may benefit winter-run salmon habitat in the Sacramento River. Additional water supply in dry periods would also provide improved flexibility for agencies that own and operate or contract for offstream storage water supply. The exchange could also result in ecosystem benefits by reducing diversions from the river during the times when some fish species and the ecosystem are in their critical stages and diversions may have the greatest impacts on fish.

The four offstream storage sites investigated include the following:

- Sites Reservoir would be located about 10 miles west of Maxwell (Figure 1-1) and formed by constructing dams on Stone Corral Creek and Funks Creek. Evaluation of a Sites Project has focused on a 1.8 million acre-foot reservoir, although a 1.2 maf reservoir has been considered. A 1.8 maf Sites Reservoir would require construction of nine saddle dams along the southern edge of the Hunters Creek watershed. Floodflows from the Colusa Basin Drain, the Sacramento River, and local tributaries are potential sources of water supply for the Sites and Colusa Projects. These water supply sources have been studied with 14 optional conveyance facilities, including existing or enlarged Tehama-Colusa and Glenn-Colusa Irrigation District canals; two new diversion and conveyance systems from the Sacramento River; and two gravity flow conveyance alternatives that include tunnels for diverting floodflows from existing upper Stony Creek reservoirs.
- Colusa Reservoir is a 3.0 maf storage proposal that would include the area inundated by the 1.8 maf Sites Reservoir, plus the adjacent Logan Creek and Hunter Creek watersheds to the north, called the Colusa Cell. The Colusa Cell requires four additional dams along Logan Ridge. Colusa Reservoir requires seven saddle dams. Water supply source and conveyance

options are essentially the same for Sites and Colusa, although capacities would likely be greater for the Colusa Project.

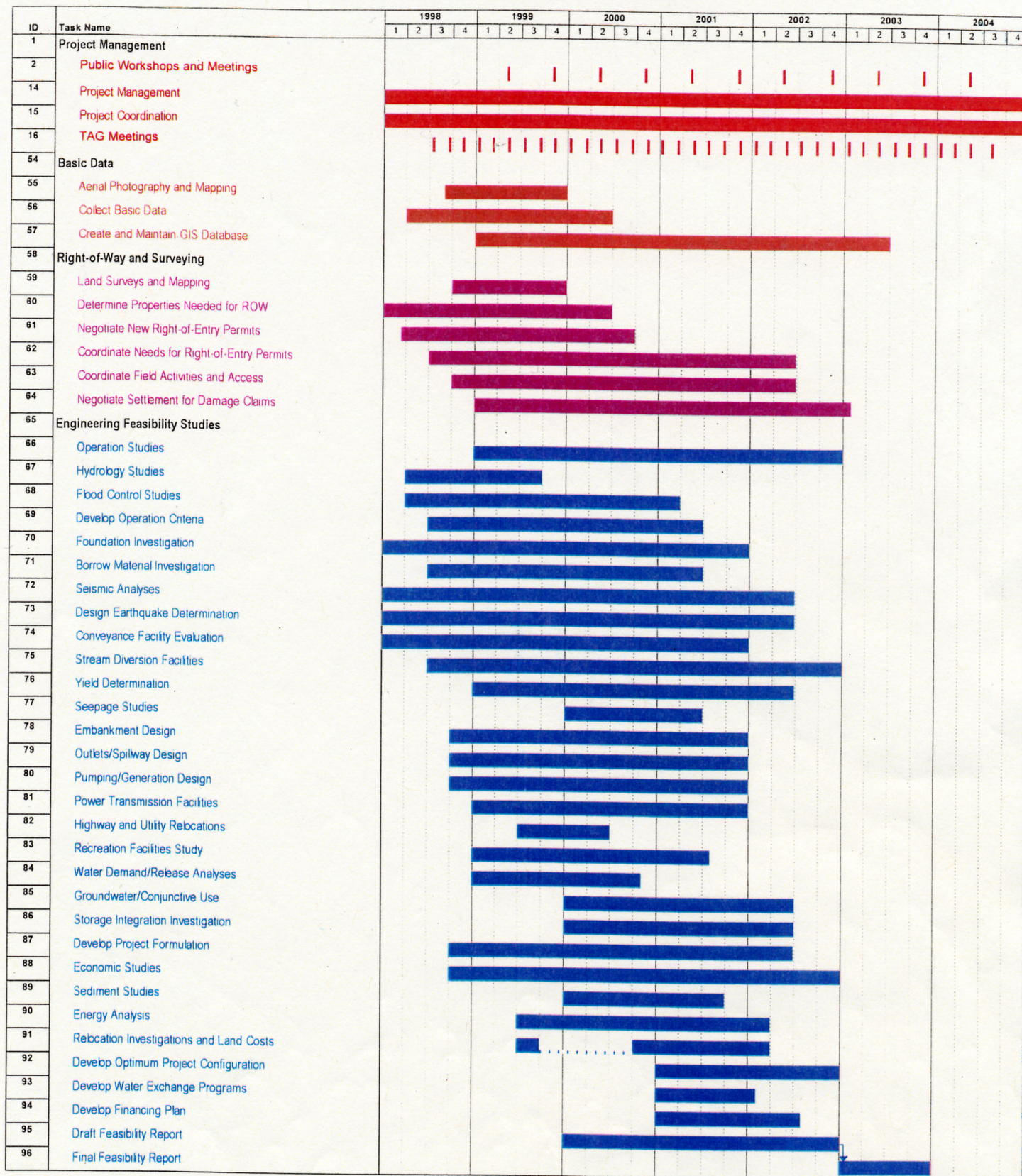
- The proposed Newville Reservoir, upstream of Black Butte Lake, is located about 18 miles west of Orland. Constructing a dam on North Fork Stony Creek and a small saddle dam at Burrows Gap would form Newville Reservoir. The alternative reservoir sizes being evaluated are 1.9 and 3.0 maf. Up to five additional saddle dams are required for the 3.0 maf reservoir alternative. Thomes Creek is the likely primary water supply source for the Thomes-Newville Project. However, conveyance alternatives to carry floodflows of Stony Creek (from Black Butte Lake) and the Sacramento River are also being considered. Prior Thomes-Newville Project studies included a diversion dam on Thomes Creek. Current planning challenges include investigating a diversion facility that would allow anadromous fish migration in Thomes Creek while allowing the creek's floodflows to be diverted to Newville Reservoir. Thomes-Newville conveyance facilities planning is not yet complete.
- The Red Bank Project would be located about 17 miles west of Red Bluff. This project was originally proposed with two major dams to create 350 thousand acre-feet of storage in Dippingvat Reservoir on South Fork Cottonwood Creek and Schoenfield Reservoir on Red Bank Creek. Two small dams and reservoirs, Lanyan and Bluedoor, would be part of the conveyance from Dippingvat to Schoenfield. Most of the water supply for this project would come from South Fork Cottonwood Creek. Floodflows would be diverted for short-term storage in Dippingvat, and then diverted to Schoenfield, the main storage reservoir.

Project Schedule

Figure 1-2 shows the schedule for Phase I and Phase II of the North of the Delta Offstream Storage Investigation. Phase II consists of an environmental documentation and permit process that will begin in mid-2000 after the Record of Decision for CALFED's Programmatic EIR/EIS is filed and if additional north of the Delta offstream storage is consistent with CALFED's preferred program alternative. The schedule is subject to several important constraints. CALFED has linked the implementation of surface storage projects with achieving specific objectives in other water management areas such as the water use efficiency program. Therefore, acquiring regulatory permits and construction of new surface storage projects can only take place after specific actions on water use efficiency are implemented and threshold levels for water use efficiency are satisfied. Water use efficiency is one of eight early implementation actions in Stage 1 of CALFED's Programmatic EIR/EIS. While Stage 1 actions are undertaken, the North of the Delta Offstream Storage Investigation will begin environmental documentation and feasibility evaluation for potential project alternatives, and will be prepared to move forward if the CALFED linkages and conditions are satisfied.

The Offstream Storage Investigation schedule is also subject to requirements imposed by the National Environmental Policy Act, California Environmental Quality Act, the Clean Water Act, and other laws and regulations

Figure 1.2
Offstream Storage Investigation -- Draft Workplan

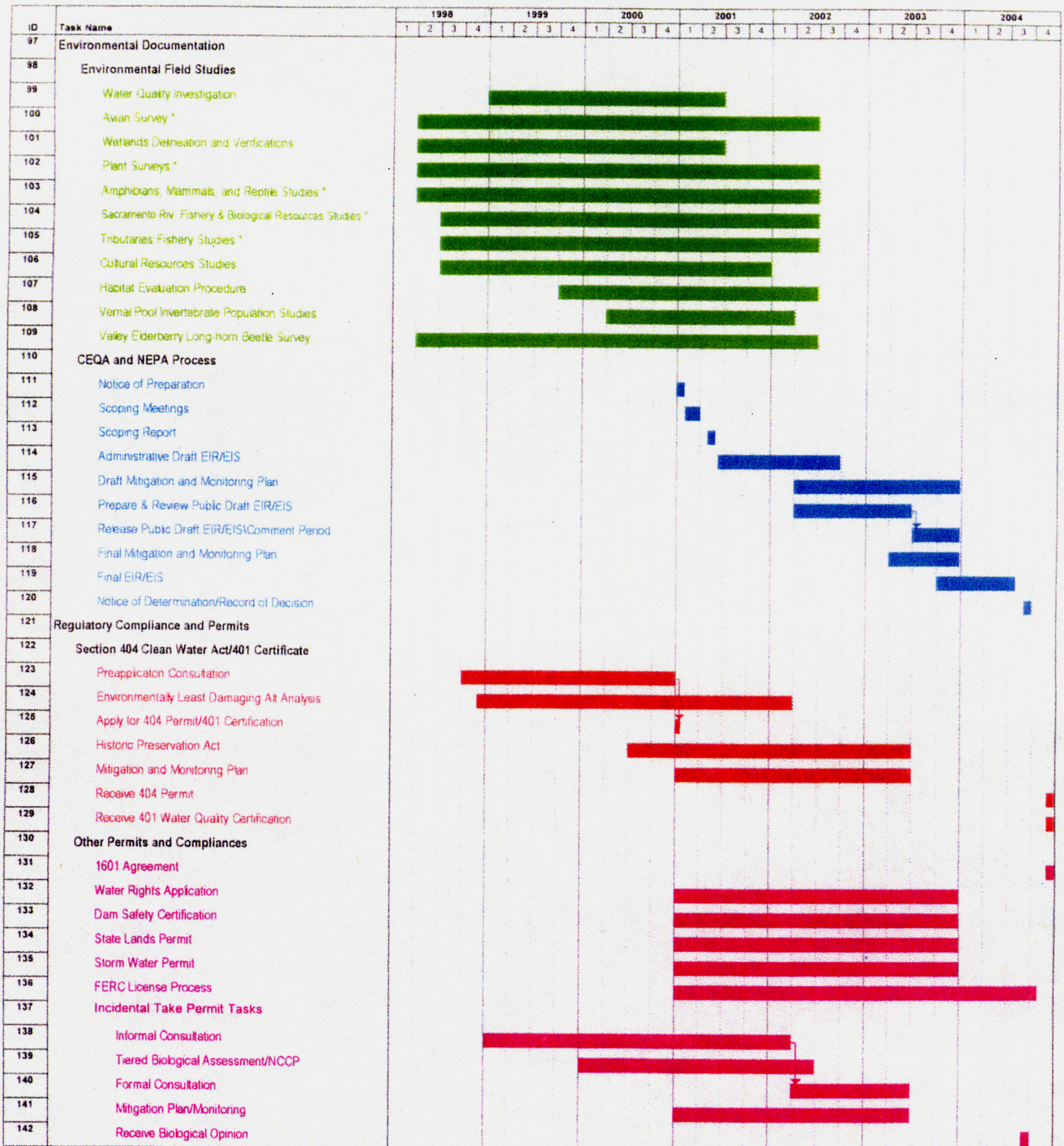


Notes: 1998 = Fiscal Year 1997-98, etc.

1997-98 work was conducted under proposition 204 authorization.

* Includes both threatened, endangered, and general species.

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Offstream Storage Investigation -- Draft Workplan



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that pertain to surface storage projects. CEQA requires public agencies to prepare an EIR that addresses environmental impacts, mitigation measures, alternatives, and public comments and responses. Project-specific CEQA/NEPA processes for surface storage projects can be initiated after the Record of Decision for the CALFED Programmatic EIS/EIR is issued finding that offstream storage is consistent with the preferred program alternative.

Section 404 of the Clean Water Act has significant implications for proposed surface water storage projects, particularly the scope of alternative evaluations. Section 404 has been interpreted broadly and requires a reservoir project proponent to undertake an extensive evaluation of alternatives and to select the “least environmentally damaging practicable alternative.” In addition to nonstructural alternative considerations such as water use efficiency, various storage sites should be evaluated to determine which alternative has the least environmental impacts. This evaluation includes detailed field surveys that follow multi-year protocols to identify the existence of threatened or endangered species or other species of concern in the project area. Botanical surveys require at least two consecutive years of detailed surveys within a given location. Fishery surveys must be conducted over the entire life cycle of the species of concern; for salmonids this requires a multi-year survey. The biological resources for each alternative reservoir site, conveyance facility, potential road relocation, and recreation facility must be surveyed in detail to provide a basis for comparison in selecting the least environmentally damaging alternative.

Past Studies

This section gives a brief description of the studies that have been conducted at the four alternative project sites prior to the current investigation.

Sites and Colusa Projects

The topographically attractive dam sites on Stone Corral and Funks Creeks appear suitable for dams. Both are deep narrow gorges with steep rock walls. The rock at Sites Dam site on Stone Corral Creek is hard enough to be used for masonry purposes and large quantities were transported by railroad to San Francisco to help rebuild after the 1906 Earthquake.

The earliest published reference to a Sites Project is found in DWR Bulletin 3, *The California Water Plan 1957*, which mentions a 48,000 af offstream storage reservoir on Stone Corral and Funks Creeks supplied by the then proposed Tehama-Colusa Canal.

DWR's Bulletin 109, *Colusa Basin Investigation 1964*, evaluated potential flood control projects and considered two separate reservoirs of 5,800 and 7,600 af on Stone Corral and Funks Creeks, respectively. An update of this report in 1990 found these reservoirs economically unjustified for flood control alone. A July 1995 draft report by the Colusa Basin Drainage District on its proposed “Water Management Program” recommends a 62-foot-high dam on Funks Creek that would impound 9,500 af in “Golden Gate Reservoir.” Project benefits are listed as flood control and modest springtime irrigation yield.

Consideration of larger projects at the Sites location was first documented in December 1964 in the U.S. Bureau of Reclamation's *West Sacramento Canal*

Unit Report, which studied the feasibility of extending the TCC (via a new West Sacramento Valley Canal) into Solano County near Fairfield. To develop additional water supply to support this canal extension plan, a 1.2 maf Sites Reservoir was proposed. This study did not evaluate the potential of Sites as a stand-alone project, but only as part of the extended canal system. USBR unsuccessfully attempted to obtain funds for a full feasibility study of Sites in 1977 and documented its finding in a report published in 1981.

Throughout the 1960s and 1970s, DWR performed limited unpublished analyses of the larger Colusa Project's water supply potential in connection with regional investigations. Two unpublished office reports in 1967 and 1968 on potential Klamath-Trinity development projects include conveyance systems that would terminate at Colusa Reservoir. DWR's progress report titled *Major Surface Water Development Opportunities in the Sacramento Valley 1975* presented details of a Colusa Reservoir Offstream Storage Project. A slightly modified version of the Colusa Reservoir plan is shown in the DWR's Bulletin 76-81: *State Water Project - Status of Water Conservation and Water Supply Augmentation Plans November 1981*. This report states that cursory-level studies of Colusa Reservoir to date indicated that the incremental cost of storage would be excessive in comparison to storage costs of Sites Reservoir.

In March 1990, the engineering consulting firm CH2M-Hill, Inc. prepared a long-range plan for Glenn-Colusa Irrigation District that included an 870,000 af Sites Reservoir with normal water surface elevation of 460 feet. This project was based on USBR's 1964 report, but was judged non-implementable by GCID because of the financing needed to cover the estimated capital cost of \$152 million. In 1993, CH2M-Hill published a report on *Meeting California's Water Needs in the 21st Century*, which presented a conceptual Westside Storage and Conveyance System. The report mentioned a Sites/Colusa Reservoir with a feeder pipeline from Lake Oroville.

In late 1995, DWR received numerous requests from water interests, including the Northern California Water Association, for information regarding the potential of an offstream storage reservoir at the Sites/Colusa site near Maxwell. In response to this renewed interest, DWR reviewed historic documents on a Sites/Colusa Project to assess its potential to augment local and statewide water supplies during drought periods. DWR conducted a brief investigation of current environmental literature, studies, project area aerial photos, and conducted limited field work in the project area. DWR published its findings in a July 1996 report entitled *Reconnaissance Survey – Sites Offstream Storage Project*.

DWR's 1996 report briefly summarized Sites/Colusa Project planning information and updated earlier cost estimates to 1995 cost levels. No insurmountable problems were identified that would prevent further evaluation of this project. Rather, DWR found that the project had several unique characteristics that make it an attractive candidate for further feasibility level investigations. It has a significantly lower cost per unit of storage than most sites and the area is sparsely populated. The geography of the site permits a range of storage options to be considered, from a minimum of approximately 1.2 maf to a maximum of 3.0 maf when it is combined with the Colusa Cell to form the Colusa Project.

Thomes-Newville Project

Newville Dam site was first examined by the U.S. Geological Survey sometime between 1901 and 1903. USGS noted that the natural runoff was quite limited and briefly considered the possibility of diverting Thames Creek water to Newville Reservoir; the current Thames-Newville Project is a direct descendant of this early USGS idea.

Newville Reservoir was again examined during the California Water Plan studies in 1947-57. The resulting framework plan, presented in DWR's Bulletin 3, suggested a 950,000 af Newville Reservoir that would be supported by gravity diversion of surplus flows from a Paskenta Reservoir on Thames Creek and a 38-mile gravity diversion canal from upper Stony and Grindstone Creeks. This proposal is the closest ancestor of the current Thames-Newville Project, since it would divert floodflows of the same sources.

The first intensive investigations of Newville Reservoir were conducted by DWR in the 1958-63 period as a part of the North Coastal Area Investigation. These studies indicated the dam site was suitable for the reservoir elevation of about 1,000 feet that was then being considered, but noted that more study of Rocky Ridge should be performed if the reservoir were to be higher than elevation 950 feet. Based on these studies, DWR's Bulletin 136 presented a plan for early construction of a Newville Reservoir at elevation 845 feet with a diversion from a Paskenta Reservoir on Thames Creek. The bulletin envisioned later integration of the Paskenta-Newville facilities into a full-fledged Glenn Reservoir development for regulation of water imported from the north coastal area.

USBR conducted much more detailed studies of the Paskenta-Newville Plan in 1965-71. USBR also concluded that conditions were suitable for construction of a large Newville Reservoir. USBR's 1971 status report outlined a plan including a Newville Reservoir at elevation 975 feet, forming a 2,986,000 af reservoir. (The reservoir size was limited by hydrologic considerations, not geologic.) The feasibility design drawings presented in USBR's report showed both Newville Dam and Chrome Dike as rolled earth-fill structures.

While USBR's studies were in progress, DWR was conducting its own studies of the possible integration of a Newville Reservoir with an upper Eel River development. DWR's design criteria led to a Newville Dam design that incorporated substantial zones of quarried rock upstream of the central rolled-earth core. Preliminary designs and cost estimates for reservoir elevations up to 1,000 feet were prepared, but Newville Reservoir was eventually dropped from the Eel River plans in favor of the more favorably located Rancheria Reservoir.

In the early 1970s, DWR made additional planning studies of Newville Reservoir as a component of a Glenn Reservoir that would be used to store surplus water pumped from the Sacramento River. The 1975 report on these studies presented a 987 foot Newville Reservoir elevation as "near the maximum size feasible due to topographic and geologic limitations" of Rocky Ridge. No new geologic studies were conducted during this planning phase.

Additional field investigations of Rocky Ridge were undertaken in 1979 as a part of the next round of planning studies. These additional geologic studies addressed lingering concerns about the structural integrity and leakage potential

of Rocky Ridge; the studies concluded that the suitability of the ridge for a reservoir elevation of up to at least 1,000 feet has been adequately established.

In November 1980, DWR published the *Thomes-Newville and Glenn Reservoir Plans – Engineering Feasibility*, which discussed the physical and operational feasibility of two potential plans for developing additional water supplies for the State Water Project. At that time, water supply and demand projections indicated that the smaller of these, the Thomes-Newville Plan to develop additional supplies from Stony and Thomes Creeks, could be needed in the mid-1990s. Subsequent studies concentrated on the Thomes-Newville Plan as a viable development in its own right. Larger offstream storage developments of the scale of the Glenn Reservoir Plan would not be needed until after the turn of the century. Further study of Glenn Reservoir was deferred.

Continuing studies showed that Thomes-Newville would fit well into a staged sequence. Accordingly, DWR elected to focus its planning efforts on the Thomes-Newville Plan to produce a plan formulation report and draft environmental impact report scheduled for release in June 1983. However, the project was deferred in June 1982 when the voters of California defeated Proposition 9, which was a referendum on the Peripheral Canal and related water projects. The Thomes-Newville Plan was included among the projects mentioned explicitly within the referendum.

Red Bank Project

Initial water development planning studies in the Cottonwood Creek Basin were conducted by USBR in the mid-1940s. USBR's staff deferred further action on the projects due to the State of California's initiation of a comprehensive study to develop "The California Water Plan." Bulletin 3 investigations of the Redding Stream Group and the Westside Stream Group concluded that the Cottonwood Creek tributary reservoirs—Hulen, Fiddlers, Rosewood, Dippingvat, and Schoenfield—should be developed primarily for local water supply, recreation, flood control, and streamflow enhancement to improve the anadromous fishery.

After the publication of Bulletin 3, DWR initiated more detailed studies of the upper Sacramento River and its tributaries between Shasta Dam and Red Bluff. This study focused on a large Iron Canyon Reservoir on the Sacramento River, but also investigated the tributary reservoirs as possible alternatives. Bulletin 150: *Upper Sacramento River Basin Investigation* (published in May 1965), concluded that the Iron Canyon Project was not economically justified, but that several of the tributary reservoirs, including Hulen and Dippingvat on Cottonwood Creek, were justified and should be considered for initial development of the upper Sacramento River Basin.

The U.S. Army Corps of Engineers, under authority of the Flood Control Act of 1962, conducted a survey "for flood control and allied purposes" of the Sacramento River drainage, including the Cottonwood Creek Basin. The Corps' survey report in December 1970 proposed two large reservoirs, (Tehama and Dutch Gulch) to provide 100-year flood control on lower Cottonwood Creek, reduce flood damages downstream along the Sacramento River and in Butte Basin, and develop a water supply that would be contracted for by the State Water Project.

The Corps' two-reservoir project was authorized by Congress in the Flood Control Act of 1970, but funding for Advanced Engineering and Design Studies did not begin until 1976. By the time the Corps completed their Phase I plan formulation in 1981, the 1970 project cost of \$170 million had increased to almost \$700 million due to inflation and more stringent design and safety criteria. The Corps' General Design Memorandum, dated May 1983, showed a total project cost of \$802 million, which pushed the cost of water to about \$400 per af. The SWP Contractors concluded that they could not afford the water supply at that price. Early in 1984, the Corps was asked to reanalyze the project, with the objective of reducing costs as much as possible. At the same time, DWR initiated a separate analysis of the upstream tributary reservoirs as possible alternative developments.

In May 1985, the Corps reanalysis estimated a total cost of \$571 million for a reformulated Dutch Gulch-Tehama Project, with an allocated cost of water of about \$216 per af. The DWR study, conducted concurrently with the Corps reanalysis and using the same design and economic criteria, showed that a combination of three tributary reservoirs – Hulen, Fiddlers, and Dippingvat – could be built for about \$427 million. These three reservoirs would develop about two-thirds the water supply of the Corps project, at a combined cost of about \$197 per af. DWR further concluded that the cost of the tributary reservoirs might be further reduced by:

1. Using the then-new roller-compacted concrete method of dam construction, which could provide substantial savings over standard concrete or earthfill construction.
2. Using Schoenfield Reservoir on Red Bank Creek to provide offstream storage for South Fork Cottonwood Creek water, thus reducing the size of Dippingvat Reservoir, the least cost-effective of the three reservoirs studied.

In May 1985, DWR announced the withdrawal of State Water Project participation in the authorized Corps project and expressed the intent to continue evaluation of the tributary projects as possible features of the SWP. In July 1985, DWR started the first of a series of studies to evaluate the engineering and economic feasibility of the tributary reservoirs. The Corps terminated their work on the project in October 1985.

In November 1987, DWR reported on a two-year pre-feasibility study of the Dippingvat-Schoenfield Project on South Fork Cottonwood Creek and Red Bank Creek in western Tehama County. The objective of the study was to develop information on the Dippingvat-Schoenfield alternative (Red Bank Project) comparable to that available on the other Cottonwood Creek tributary projects (i.e., Hulen Reservoir on the North Fork, Fiddlers Reservoir on the Middle Fork, and Rosewood Reservoir on Dry Creek) as a basis for selecting one project for further study at the feasibility level. Efforts on this study were centered primarily on geologic investigation of the project dam sites, sources of construction materials, and engineering analysis of project operations and cost estimates.

These studies, completed in 1993, recommended the roller-compacted concrete dam construction alternative. Further investigations were deferred until CALFED renewed interest in 1996.

Public Involvement

Extensive public involvement activities are an integral part of the North of the Delta Offstream Storage Investigation. Program participants have briefed local entities frequently during the course of the investigation. DWR, in cooperation with CALFED, has held public workshops and meetings to provide information about the proposed reservoir alternatives and to answer questions about the investigation. Public workshops will continue periodically throughout the duration of the program.

In November 1999, a technical briefing and tour of the Sacramento River and Sites Reservoir was given for Legislative and Governor's Office staff. During this tour, information was provided on Sacramento River ecosystem restoration, geomorphology, conveyance alternatives, biological field surveys, and geologic and seismic findings at Sites Reservoir.

In April 1998, DWR established a technical advisory group to assist DWR staff in developing study plans. Technical advisory group meetings are held bimonthly to review work in progress and comment on the content and adequacy of various elements of investigation. The TAG consists of interested parties from federal, State, and local agencies, as well as environmental groups, and property owners in the project area.

Special thanks go to the advisory group members. DWR is indebted to the members for providing critical feedback on the content and direction of the investigation. The committee members' comments and support contribute greatly to the process and to developing a balanced approach for the North of the Delta Offstream Storage Investigation. DWR gratefully acknowledges the input and advice from the members.

North of the Delta Offstream Storage Investigation Technical Advisory Group

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Glenn-Colusa Irrigation District
Tehama Colusa Canal Authority
CALFED
State Water Project Contractors
Friends of the River
California Cattlemens Association
Northern California Water Association
Colusa Basin Drainage District
County of Colusa
Orland Unit Water Users' Association
Sacramento River Preservation Trust
U.S. Fish and Wildlife Service
Farm Bureau
U.S. Army Corps of Engineers
Department of Fish and Game
U.S. Bureau of Reclamation